# Profiling high-range speeding offenders: Investigating criminal history, personal characteristics, traffic offences, and crash history

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## Abstract

This paper reports profiling information for speeding offenders and is part of a larger project that assessed the deterrent effects of increased speeding penalties in Queensland, Australia, using a total of 84,456 speeding offences. The speeding offenders were classified into three groups based on the extent and severity of an index offence: *once-only low-rang offenders; repeat high-range offenders;* and *other offenders.* The three groups were then compared in terms of personal characteristics, traffic offences, crash history and criminal history. Results revealed a number of significant differences between *repeat high-range offenders* and those in the other two offender groups. *Repeat high-range speeding offenders* were more likely to be male, younger, hold a provisional and a motorcycle licence, to have committed a range of previous traffic offences, to have a significantly greater likelihood of crash involvement, and to have been involved in multiple-vehicle crashes than drivers in the other two

offender types. Additionally, when a subset of offenders' criminal histories were examined, results revealed that *repeat high-range speeding offenders* were also more likely to have committed a previous criminal offence compared to *once only low-range* and *other offenders* and that 55.2% of the *repeat high-range offenders* had a criminal history. They were also significantly more likely to have committed drug offences and offences against order than the *once only low-range speeding offenders*, and significantly more likely to have committed regulation offences than those in the *other offenders* group. Overall, the results indicate that speeding offenders are not an homogeneous group and that, therefore, more tailored and innovative sanctions should be considered and evaluated for high-range recidivist speeders because they are a high-risk road user group.

Keywords

Speeding, recidivist, repeat offender, offender profiling, intelligent speed adaptation, driver characteristics

Highlights

Queensland speeding offences (N=84,456) were used to profile repeat high-range offenders.

Significant differences found for age, gender, licence class and traffic offences.

Crash and criminal history also significantly higher for repeat high-range offenders.

Results highlight that speeding offenders are not an homogeneous group.

Tailored countermeasures are needed for this high-risk road user group.

## 1. Introduction

Death and injury from speed-related crashes are a significant public health problem worldwide (Peden et al., 2004). Previous research has consistently demonstrated a positive relationship between vehicle speed and crash risk (Aarts & van Schagen, 2006; Kloeden et al., 1997), as well as crash severity, as evidenced by the greater contribution of speed to the proportion of fatal crashes compared to total

crashes and those resulting in less damage or injury (Fildes et al., 2005; Keall et al., 2001). Indeed, research has suggested that exceeding the average traffic flow speed by 5 km/h in urban areas or 10 km/h in rural areas doubles the risk of a casualty crash and is equivalent to the increase in risk of crash involvement associated with operating a motor vehicle with a blood alcohol concentration of .05g/mL (Kloeden, et al., 1997).

In Queensland in 2012, speed was reported to be a contributing factor in 21% of fatalities (Transport and Main Roads, 2014), whilst Australia-wide, speeding has been identified as a contributing factor in up to 30% of all fatal crashes (Australian Transport Council, 2011). Excessive speed and driving too fast for the conditions have also been demonstrated to be a leading contributing factor to crashes in many other countries, both developed and developing (Afukaar, 2003; Liu et al., 2005; Odero et al., 1997; Robinson & Singh, 2006; Treat et al.,1979).

### *1.1 Factors associated with speeding behaviour*

Previous research has highlighted a myriad of factors associated with speeding behaviour including personal, social, situational and legal factors. This particular study focuses on the personal factors contributing to speeding behaviour. Past studies have found a relationship between speeding behaviour and age and gender, with higher speeds more typical among males and younger drivers (Stradling et al., 2003; Williams et al., 2006). A positive relationship has also been reported between speeding and crash involvement, speeding violations and other traffic violations (Brown, 2002; Parker et al.,1995; Stradling, et al., 2004; Williams, et al., 2006), as well as individuals with a predisposition to sensation seeking (Jonah, 1997), higher levels of perceived driving ability (Stradling, et al., 2004), lower perceptions of risk (Harrison et al., 1998) and who receive greater pleasure from fast driving (Rothengatter, 1988). In addition, more favourable attitudes toward speeding have been found to be

associated with greater levels of speeding and intentions to speed (Fleiter & Watson, 2006; Stradling, et al., 2004). Finally, number of personality factors have also been found to be associated with a greater propensity to exceed the speed limit including Type-A personality behaviour patterns (Tay, Champness, & Watson, 2003), higher levels of social deviance (West & Hall, 1997), perceived invulnerability and heightened internal locus of control (Corbett, 2001), authority-rebellion (Fernandes, Job, & Hatfield, 2007) and negative emotions such as anger and frustration (Fuller et al., 2008; Iversen & Rundmo, 2002).

### *1.2 Deterrence theory as it relates to speeding penalties*

Deterrence principles underpin many road safety countermeasures and make the assumption that drivers actively consider the consequences of their actions each time they drive (Harrison, 1998; Homel, 1988). Specifically, deterrence theory posits that the influence of legal threats is based on the perceived risk of punishment, and that this risk is determined by a combination of the perceived risk of being apprehended and the perceived certainty, severity, and swiftness of legal sanctions associated with apprehension (Ross, 1982). One aspect of the theory, perceived severity of penalties, is particularly relevant to the current study which is part of a larger program of research assessing the effectiveness of speeding penalty changes among speeding offenders in the Australian state of Queensland (see below for further details). Importantly, if increases in penalties fail to alter the beliefs about the likelihood or severity of punishment, such increases are unlikely to deter speeding behaviour. Furthermore, deterrence relies not only on what potential offenders believe the risk of receiving sanctions to be, but also on how they evaluate such risks. The subjective nature of deterrence principles requires that potential offenders know about changes to sanctions and perceive such changes as producing meaningful increases to the risk of detection and punishment (von Hirsch, et al., 2000). It has been suggested that offenders may not perceive deterrence principles in a homogenous manner (Fleiter et al., 2010; Freeman et al., 2006). Indeed, a recent study of serious youth offenders in

two states in the US reported that more serious offenders (based on the frequency of prior offending) were more likely to report lower perceptions of the risks associated with detection and punishment, and perceive the rewards associated with offending as being greater and the costs as lower, compared to less serious offenders (Loughran et al., 2012). The authors argued that these differences create ceiling and floor effects in perceptual deterrence and help explain why more serious offenders may not be as readily deterred by enforcement and sanctions. The extent to which this applies to behaviours such as speeding is not known. As discussed in greater detail in the next section, little is currently known about different types of speeding offenders and therefore, about how penalty changes may influence them.

### *1.3 Speeding recidivists and high-range offenders*

In many countries, including Australia, speeding drivers have traditionally been considered to be an homogeneous group (Fildes & Lee, 1993; Stead et al., 2005). However, there is a growing body of evidence to suggest that there are sub-groups of speeding drivers. Of particular interest are recidivists, or those drivers with multiple speeding offences. This term is often used interchangeably with 'repeat offender', 'persistent offender', 'habitual offender' and 'hard core offender' and is commonly used when discussing drink driving offenders (Freeman, et al., 2006; Hedlund & Fell, 1995; Styles et al., 2009; Yu, 2000). However, recidivism can be conceptualised in a number of different ways which have important implications for the development of countermeasures. For example, a driver who unintentionally commits two low range speeding offences could be argued to be different to a driver who persistently, intentionally and excessively exceeds speed limits. This latter type of driver might more appropriately be termed a 'persistent' or 'hard core' speeding offender.

There is also an emerging body of research investigating the characteristics and motivations of recidivist and/or high-range speeding offenders, in particular, examining the relationship between speeding and other traffic and criminal behaviour. In a pilot project of 200 drivers in Queensland who were apprehended and fined for speeding on one particular day in 1999 (termed the index offence), prior and subsequent traffic histories was analysed for a five year period either side of the index offence (Manderson et al., 2004). The presence of speed convictions in the 12 months prior to the index offence was predictive of the severity of the index offence. Those with one or more prior convictions were 2.6 times more likely to be detected exceeding the speed limit by more than 20 km/hr (termed a high-speed offence) at the time of the index offence. A number of other studies have also highlighted the relationship between high-range speeding offences and a greater likelihood of subsequent speeding and other traffic offences, as well as crash involvement (Delaney et al., 2003; Lawpoolsri et al., 2007; Li et al., 2011; Williams, et al., 2006).

A similar study, though not specific to speeding, was conducted in Britain to map associations between traffic offending behaviours with other criminal activity (Rose, 2000). Drivers were classified into three groups of serious traffic offenders: drink drivers, disqualified drivers, and dangerous drivers. The latter group included those who had been convicted of speeding by excessive amounts. Comparisons using criminal history data revealed that a substantial proportion of offenders from each of the three driver groups had criminal convictions. Disqualified drivers showed the most involvement with other forms of crime, followed by dangerous drivers, and then drink drivers. Similar findings were reported in a study conducted in the Australian state of Victoria that showed that 22.5% of all speeding offenders had a criminal history and that offenders with a history of other traffic-related offences were 1.5 times more likely to have committed a high-speed offence (Delaney, et al., 2003).

Taken together, the research suggests that there is a positive association between certain types of traffic offending and non-traffic related histories and that serious traffic offenders, therefore, should not necessarily be thought of in isolation from other criminals. Authorities face many challenges in attempting to influence the behaviour of such groups of drivers, as there are, it seems, multiple offending behaviours to contend with. Nonetheless, a deficit remains in our knowledge of speeding recidivists and high-range offenders, including their characteristics, motivations, and intentions. In order to determine the optimal approach to developing, delivering and evaluating offender management interventions, the limited knowledge we have about speeding drivers generally, and recidivists and high-range offenders in particular, needs to be extended.

This paper examines an aspect of the data taken from a larger study evaluating the effect of speeding penalty changes on speeding recidivism in Queensland. The main aim of the larger study was to examine the effects of penalty changes (introduced in April 2003) on driver behaviour by comparing data collected two years prior and subsequent to the penalty changes. For more information about these changes, see Watson et al., 2010 and Watson et al., 2014. Additionally, the project aimed to investigate the profile of speeding offenders in terms of their personal characteristics and traffic and criminal offending and crash histories. This paper reports results relating to this latter profiling aspect of the project. Specifically, we used demographic data and data relating to the previous traffic offences, crash involvement and criminal offences of two cohorts of offenders (i.e., those whose index offence occurred prior to the penalty changes and those whose index offence occurred after the penalty changes) to explore the characteristics and predictors of high-range speeding behaviour.

## 2. Material and methods

Traffic offence data from May 1996 to August 2007 were provided to the research team by the Queensland Department of Transport (now known as the Department for Transport and Main Roads) from the Transport, Registration and Integrated Licensing System (TRAILS). Crash involvement data were also provided from the Queensland Road Crash Database. These data were provided for two cohorts of offenders: individuals who committed a speeding offence in May 2001; and individuals who committed a speeding offence in May 2003 which was the month immediately after the speeding penalty changes. The first such offence in the month was taken to be the index offence. Data obtained included details of this offence, previous (5 years) and subsequent traffic offences (including speeding, alcohol, dangerous driving, unlicensed driving, seatbelt and other offences), previous (5 years) crash history, and the offenders' demographic characteristics (gender, age), licence level, and licence class. Offenders who did not hold a Queensland driver's licence were excluded from analyses given that their demographic, licensing and offences histories were unknown. Individuals with missing licence information (3.7%) were also excluded. The final sample, after data cleaning and all exclusions was $N$ = 84,456. As outlined in the results below, there were no significant differences between the two year cohorts on any key variables so all analyses were performed with the combined sample.

We classified offenders according to the severity and amount of offences committed in a seven year period (five years prior to index offence and a two year follow up period). *Repeat high-range offenders* were identified as those offenders who committed two or more speeding offences in the study period, where at least two of the offences were for a recorded speed of 30 km/hr or greater over the speed limit. For comparison purposes we created two additional offender categories: *Once only low-range offenders* (those who committed one low-range speeding offence in the time-frame[1]) and *Other offenders* (all other offenders who committed at least one mid-range or high-range offence, but no more than one offence at 30 km/hr or more above the speed limit). In addition, de-identified lifetime criminal history data of a random sample of these speeding offenders were obtained from the Queensland

[1] The lowest level of offence category changed from 'Less than 15 km/hr' to 'Less than 13 km/hr' when the penalty change occurred in 2003.

Police Service (QPS)[2]. In total, a subset of 1,000 offenders was selected, consisting of 300 *Once only low-range offenders*, 300 *Other offenders*, and 400 *Repeat high-range offenders*.

### *2.1 Statistical analyses*

Given the large sample size for the traffic offence and crash-related analyses, a more stringent alpha level of 0.1% was used for determining statistical significance. However, the analyses using the criminal offence data employed a smaller sample size, so a less stringent alpha level of 1.0% was adopted. Analyses investigating differences in personal characteristics and offence histories of the different types of speeding offenders were conducted using chi-square tests for independence, with Cramer's V ($\varphi_c$) calculated to provide an estimate of effect size and provide greater clarity regarding the meaningfulness of any statistically significant findings[3]. Post-hoc analyses were conducted using adjusted standardised residual statistics, which identify those cells with observed frequencies significantly higher or lower than expected. With the alpha level set at 0.1% for all analyses, any adjusted standard residuals outside ± 3.29 were considered significant.

In order to address the multivariate relationships between the variables, two logistic regressions were also performed. The first analysis used offender type as the outcome (*repeat high range* vs. *other offenders*), with the demographic characteristic variables and previous traffic offences (alcohol-related, dangerous driving, unlicensed driving, seatbelt offences and other offences) used as predictors. The second analysis also used offender type as the outcome (*once only low-range* vs. *repeat high-range*), however only used the demographic characteristic variables and previous alcohol-related offences as predictors, since the *once only low-range offenders* had no offence history in relation to the other offence types, and thus no variance.

[2] The decision to obtain criminal history data for only a sub-sample of offenders was based on the lengthy process involved in manually extracting these criminal offence records.
[3] As suggested by Aaron and Aaron (2003), a Cramer's V of approximately .10 is considered to be a small effect size, .30 a moderate effect size and .50 or more a large effect size.

## 3. Results

### *3.1 Profiling speeding offenders based on personal characteristics*

Overall, demographic and offence and crash history data were acquired for 84,456 offenders. Of these, a total of 4,893 (5.8%) were classified as *once only low-range offenders*, 76,453 (90.5%) as *other offenders*, and 3,110 (3.7%) as *repeat high-range offenders*. Results of the Chi-square tests for independence revealed that the *repeat high-range offenders* differed significantly on all demographic variables (age, gender, licence level and licence class), when compared to both the *once only low-range* and *other offenders*, however the strength of these effects differed (see Table 1). Specifically, Cramer's V calculations ($\varphi_c$) indicated a small effect size for licence class, moderate effect sizes for gender and licence level, and a large effect size for age when comparing low and high-range offenders. Conversely, all effect sizes were found to be small when comparing *repeat high-range* and *other offenders*. The adjusted standardised residuals indicated that *repeat high-range offenders* were significantly more likely to be male, younger, hold a provisional licence, and hold a motorcycle licence when compared to *once only low-range* or *other offenders*. The *repeat high-range offenders* were also significantly less likely to hold a heavy vehicle licence[4].

Table 1. Personal characteristics of each speeding offender group.

| Variable | Level | *Once only low-range* offenders | | *Other* offenders | | *Repeat high-range* offenders | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| Gender | Male | 2,473 | 50.5* | 49,788 | 65.1* | 2,806 | 90.2 |
| | Female | 2,420 | 49.5* | 26,665 | 34.9* | 304 | 9.8 |

[4] While there are many classes of heavy vehicle licences in Australia, such licences typically refer to vehicles with a gross vehicle mass of 4.5 tonnes or more.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | $\chi^2$ (1) = 1,333.7, $p$ < .001, $\varphi_c$ = .41 | | $\chi^2$ (1) = 840.4, $p$ < .001, $\varphi_c$ = .10 | | Referent | |
| Age | 17-24 | 460 | 9.4* | 13,118 | 17.2* | 1,258 | 40.5 |
| | 25-29 | 404 | 8.3* | 10,154 | 13.3* | 699 | 22.5 |
| | 30-39 | 1,054 | 21.5 | 19,286 | 25.2 | 695 | 22.3 |
| | 40-49 | 1,111 | 22.7* | 17,354 | 22.7* | 315 | 10.1 |
| | 50-59 | 989 | 20.2* | 11,476 | 15.0* | 119 | 3.8 |
| | 60-69 | 541 | 11.1* | 3,758 | 4.9* | 19 | 0.6 |
| | 70+ | 334 | 6.8* | 1,307 | 1.7 | 5 | 0.2 |
| | | $\chi^2$ (6) = 2,166.9, $p$ < .001, $\varphi_c$ = .52 | | $\chi^2$ (6) = 1,721.1, $p$ < .001, $\varphi_c$ = .15 | | Referent | |
| Licence level | Learner | 165 | 3.4* | 3,149 | 4.1 | 190 | 6.1 |
| | Provisional | 239 | 4.9* | 7,167 | 9.4* | 904 | 29.1 |
| | Open | 4,489 | 91.7* | 66,137 | 86.5* | 2,016 | 64.8 |
| | | $\chi^2$ (2) = 980.2, $p$ < .001, $\varphi_c$ = .35 | | $\chi^2$ (2) = 1,334.2, $p$ < .001, $\varphi_c$ = .13 | | Referent | |
| Licence class | Car only | 3,445 | 70.4* | 49,569 | 64.8* | 1,698 | 54.6 |
| | Motorcycle | 906 | 18.5* | 18,461 | 24.1* | 1,197 | 38.5 |
| | Heavy vehicle only | 496 | 10.1* | 7,360 | 9.6* | 160 | 5.1 |
| | Car and heavy vehicle | 46 | 0.9* | 1,063 | 1.4 | 55 | 1.8 |
| | | $\chi^2$ (3) = 430.7, $p$ < .001, $\varphi_c$ = .23 | | $\chi^2$ (3) = 364.2, $p$ < .001, $\varphi_c$ = .07 | | Referent | |

Note: Cramer's V = $\varphi_c$ (small = .10, moderate = .30, large = .50).
* Standardised residuals outside ± 3.29.

### *3.2 Profiling speeding offenders based on traffic offence and crash history*

A series of Chi-square analyses were also conducted to compare the traffic offence and crash histories of the three offender groups. It should be noted that except for one offence type (alcohol related offences), the *once only low-range offenders* had no previous offences in the study time-frame. Similar to the findings described above, results revealed that the *repeat high-range offenders* differed significantly for all offence types, and for previous crash involvement, when compared to either of the

other two offender groups; however the strength of these differences varied (see Table 2). Specifically, when comparing *once only low-range* and *repeat high-range offenders*, Cramer's V statistics suggested a small effect size for alcohol, dangerous driving, unlicensed and seatbelt offences, as well as previous crash involvement, and a large effect size for other offences. Conversely, very small effect sizes were found when comparing *other offenders* and *repeat high-range offenders*. Of particular interest is the fact that 15.3% of the *repeat high-range offenders* had been involved in a crash in the five year period prior to the index speeding offence, compared to only 2.9% of the *once only low-range offenders* and 6.6% of the *other offenders.*

Table 2. Traffic offence and crash history for each speeding offender group.

| Variable | Level | *Once only low-range* offenders | | *Other* offenders | | *Repeat high-range* offenders | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| Alcohol related offence | Yes | 70 | 1.4* | 3,287 | 4.3 | 355 | 11.4 |
| | No | 4,823 | 98.6* | 73,166 | 95.7* | 2,755 | 88.6 |
| | | $\chi^2$ (1) = 376.9, $p$ < .001, $\varphi_c$ = .22 | | $\chi^2$ (1) = 346.3, $p$ < .001, $\varphi_c$ = .07 | | Referent | |
| Dangerous driving offence | Yes | 0 | 0.0* | 640 | 0.8 | 107 | 3.4 |
| | No | 4,893 | 100.0* | 75,813 | 99.2* | 3,003 | 96.6 |
| | | $\chi^2$ (1) = 170.6, $p$ < .001, $\varphi_c$ = .15 | | $\chi^2$ (1) = 217.8, $p$ < .001 $\varphi_c$ = .05 | | Referent | |
| Unlicensed driving offence | Yes | 0 | 0.0* | 1,052 | 1.4* | 257 | 8.3 |
| | No | 4,893 | 100.0* | 75,401 | 98.6* | 2,853 | 91.7 |
| | | $\chi^2$ (1) = 417.8, $p$ < .001, $\varphi_c$ = .23 | | $\chi^2$ (1) = 876.3, $p$ < .001, $\varphi_c$ = .11 | | Referent | |
| Seatbelt offence | Yes | 0 | 0.0* | 2,573 | 3.4* | 279 | 9.0 |
| | No | 4,893 | 100.0* | 73,890 | 96.6* | 2,831 | 91.0 |
| | | $\chi^2$ (1) = 454.8, $p$ < .001, $\varphi_c$ = .24 | | $\chi^2$ (1) = 271.8, $p$ < .001, $\varphi_c$ = .06 | | Referent | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other offence | Yes | 0 | 0.0* | 10,403 | 13.6* | 1,136 | 36.5 |
| | No | 4,893 | 100.0* | 66,050 | 86.4* | 1,974 | 63.5 |
| | | $\chi^2$ (1) = 2,082.9, $p$ < .001 $\varphi_c$ = .51 | | $\chi^2$ (1) = 1,265.8, $p$ < .001, $\varphi_c$ = .13 | | Referent | |
| Previous crash involvement | Yes | 141 | 2.9* | 5,063 | 6.6* | 475 | 15.3* |
| | No | 4,731 | 97.1* | 71,390 | 93.4 | 2,635 | 84.7* |
| | | $\chi^2$ (1) = 410.96, $p$ < .001, $\varphi_c$ = .24 | | $\chi^2$ (1) = 345.35, $p$ < .001, $\varphi_c$ = .07 | | Referent | |

Note: Cramer's V = $\varphi_c$ (small = .10, moderate = .30, large = .50).
* Standardised residuals ± 3.29.

A number of additional analyses were conducted to investigate the characteristics of the crashes that offenders had been involved in prior to their index offence. Of the 84,456 offenders, 5,679 (6.7%) had been involved in a total of 6,072 police reported crashes as a driver or rider in the five years prior to their index offence. As shown in Table 3, of those involved in crashes, 367 (6.5%) were involved in 2 or more crashes in the period. There was no significant difference at the 0.1% level between *once only low-range* and *repeat high-range offenders* in the proportion involved in one versus two or more crashes prior to their index offence, but numbers involved are relatively modest. On the other hand a significant difference was found between the *other offender* and *repeat high-range offender* groups in this respect. A significantly smaller proportion of *repeat high-range offenders* were involved in crashes while driving a heavy vehicle compared to the other two offender groups; however there were no differences between offender types for crashes involving passenger vehicles or motorcycles. While there was no significant difference in the severity distribution of crashes on the basis of offender type, the *repeat high-range offenders* were found to have significantly greater involvement in single-vehicle crashes compared to both the *once only low-range* and *other offenders* (and significantly less involvement in multiple vehicle crashes). Finally, when considering all multi-vehicle crashes, there were no significant differences between offender types regarding who was deemed to be most-at-fault in the crash.

Table 3. Characteristics of offender crashes according to offender type.

| Variable | Level | *Once only low-range* offenders n | *Once only low-range* offenders % | *Other* offenders n | *Other* offenders % | *Repeat high-range* offenders n | *Repeat high-range* offenders % |
|---|---|---|---|---|---|---|---|
| Number of crashes | One | 138 | 97.9 | 4,748 | 93.8 | 426 | 89.7 |
| | Two or more | 3 | 2.1 | 315 | 6.2 | 49 | 10.3 |
| | | $\chi^2$ (1) = 9.43, $p$ = .002, $\varphi_c$ = .12 | | $\chi^2$ (1) = 11.85, $p$ < 0.001, $\varphi_c$ = .05 | | Referent | |
| Vehicle type | Passenger vehicle | 129 | 89.6 | 4,822 | 89.8 | 485 | 91.9 |
| | Motorcycle | 3 | 2.1 | 226 | 4.2 | 33 | 6.3 |
| | Heavy vehicle | 12 | 8.3* | 324 | 6.0* | 10 | 1.9 |
| | | $\chi^2$ (2) = 18.06, $p$ < .001, $\varphi_c$ = .16 | | $\chi^2$ (2) = 19.34, $p$ < .001, $\varphi_c$ = .06 | | Referent | |
| Crash severity | Fatal | 2 | 1.4 | 26 | 0.5 | 1 | 0.2 |
| | Hospitalisation | 21 | 14.6 | 824 | 15.3 | 84 | 15.9 |
| | Medical treatment | 36 | 25.0 | 1,410 | 26.1 | 119 | 22.5 |
| | Minor injury | 18 | 12.5 | 873 | 16.2 | 65 | 12.3 |
| | Property damage | 67 | 46.5 | 2,266 | 42.0 | 260 | 49.1 |
| | | $\chi^2$ (4) = 4.25, $p$ = .373, $\varphi_c$ = .08 | | $\chi^2$ (4) = 13.89, $p$ = .008, $\varphi_c$ = .05 | | Referent | |
| Crash type | Pedestrian | 5 | 3.5 | 134 | 2.5 | 13 | 2.5 |
| | Single vehicle | 25 | 17.4 | 1,056 | 19.6 | 154 | 29.1* |
| | Multi vehicle | 108 | 75.0 | 4,147 | 76.8 | 359 | 67.9* |
| | Other[a] | 6 | 4.2 | 62 | 1.1 | 3 | 0.6 |
| | | $\chi^2$ (3) = 18.11, $p$ < .001, $\varphi_c$ = .16 | | $\chi^2$ (3) = 28.10, $p$ < .001, $\varphi_c$ = .07 | | Referent | |
| At-fault | Yes | 38 | 35.2 | 1,937 | 46.7 | 181 | 50.4 |
| | No | 70 | 64.8 | 2,210 | 53.3 | 178 | 49.6 |
| | | $\chi^2$ (1) = 7.74, $p$ = .005, $\varphi_c$ = .13 | | $\chi^2$ (1) = 1.83, $p$ = .177, $\varphi_c$ = .02 | | Referent | |

Note: Cramer's V = $\phi_c$ (small = .10, moderate = .30, large = .50).

[a] Other relates to crashes coded as 'other' as the crash nature (e.g., hit animal crashes).

* These cells had a major contribution to the chi-square result (standardised residuals ± 3.29).

Analyses also investigated differences in the contributing factors associated with crashes across the offender types (see Table 4). Results revealed a significantly greater proportion of *repeat high-range offenders* were involved in speed-related crashes compared to both the *once only low-range* and *other offenders*. However, there were no differences between offender types in the contribution of other factors, such as alcohol, fatigue, other dangerous behaviours or road and vehicle conditions.

Table 4. Contributing circumstances of crashes according to speeding offender group.

| Variable | Level | *Once only low-range* offenders | | *Other* offenders | | *Repeat high-range* offenders | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| Illegal BAC | Yes | 3 | 2.1 | 144 | 2.7 | 22 | 4.2 |
| | No | 141 | 97.9 | 5,255 | 97.3 | 507 | 95.8 |
| | | $\chi^2$ (1) = 1.36, $p$ = .243, $\varphi_c$ = .05 | | $\chi^2$ (1) = 3.94, $p$ = .047, $\varphi_c$ = .03 | | Referent | |
| Alcohol related | Yes | 6 | 4.2 | 218 | 4.0 | 35 | 6.6 |
| | No | 138 | 95.8 | 5,181 | 96.0 | 494 | 93.4 |
| | | $\chi^2$ (1) = 1.19, $p$ = .276, $\varphi_c$ = .04 | | $\chi^2$ (1) = 7.84, $p$ = .005, $\varphi_c$ = .04 | | Referent | |
| Fatigue | Yes | 2 | 1.4 | 171 | 3.2 | 25 | 4.7 |
| | No | 142 | 98.6 | 5,228 | 96.8 | 504 | 95.3 |
| | | $\chi^2$ (1) = 3.27, $p$ = .070, $\varphi_c$ = .07 | | $\chi^2$ (1) = 3.66, $p$ = .060, $\varphi_c$ = .03 | | Referent | |
| Speed | Yes | 1 | 0.7 | 146 | 2.7 | 39 | 7.4* |
| | No | 143 | 99.3 | 5,253 | 97.3 | 490 | 92.6 |
| | | $\chi^2$ (1) = 10.03, $p$ < .001, $\varphi_c$ = .12 | | $\chi^2$ (1) = 34.73, $p$ < .001, $\varphi_c$ = .08 | | Referent | |
| Dangerous | Yes | 3 | 2.1 | 227 | 4.2 | 24 | 4.5 |
| | No | 141 | 97.9 | 5,172 | 95.8 | 505 | 95.5 |
| | | $\chi^2$ (1) = 1.77, $p$ = .183, $\varphi_c$ = .05 | | $\chi^2$ (1) = 0.13, $p$ = .717, $\varphi_c$ = .01 | | Referent | |
| Road rules | Yes | 24 | 16.7 | 944 | 17.5 | 75 | 14.2 |
| | No | 120 | 83.3 | 4,455 | 82.5 | 454 | 85.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | $\chi^2$ (1) = 0.56, $p$ = .455, $\varphi_c$ = .03 | | $\chi^2$ (1) = 3.70, $p$ = .054, $\varphi_c$ = .03 | | Referent | |
| Road conditions | Yes | 13 | 9.0 | 439 | 8.1 | 46 | 8.7 |
| | No | 131 | 91.0 | 4,960 | 91.9 | 483 | 91.3 |
| | | $\chi^2$ (1) = 0.02, $p$ = .901, $\varphi_c$ = .01 | | $\chi^2$ (1) = 0.20, $p$ = .651, $\varphi_c$ = .01 | | Referent | |
| Vehicle related | Yes | 2 | 1.4 | 94 | 1.7 | 14 | 2.6 |
| | No | 142 | 98.6 | 5,305 | 98.3 | 515 | 97.4 |
| | | $\chi^2$ (1) = 0.77, $p$ = .380, $\varphi_c$ = .03 | | $\chi^2$ (1) = 2.21, $p$ = .137, $\varphi_c$ = .02 | | Referent | |

Note: Cramer's V = $\phi_c$ (small = .10, moderate = .30, large = .50).
* These cells had a major contribution to the chi-square result (standardised residuals ± 3.29).

### *3.3 Profiling speeding offenders based on previous criminal history*

Of the subsample of 1,000 speeding offenders, 303 (30.4%) had at least one previous criminal offence. This corresponds after re-weighting, to 21.5% (standard error, 2.1%) for the entire sample. As can be seen in Table 5, the most common criminal offence committed by speeding offenders in the subsample were property (e.g., stealing, break and enter) and drug offences. One in ten had also committed offences against order (e.g., disorderly conduct, public nuisance). Overall, offences against a person (e.g., assault), traffic offences (e.g., drink driving, unlicensed driving, dangerous driving) and regulation offences (e.g., gaming, prostitution, liquor licensing) were relatively less common.

Table 5. Number and proportion of criminal offences (by type) among the subsample of speeding offenders.

| Offence type | N | % |
|---|---|---|
| Property offences | 159 | 15.9 |
| Drug offences | 145 | 14.5 |
| Offences against order | 102 | 10.2 |
| Person offences | 73 | 7.3 |
| Traffic offences [a] | 70 | 7.0 |
| Regulation offences | 46 | 4.6 |

[a] Traffic offences refer to those in which a person would appear in court and include drink driving, unlicensed driving, dangerous driving, and driving an unregistered vehicle (but not those dealt with by traffic infringement notice).

To investigate whether there were any differences in lifetime criminal histories between the three offender groups, a series of chi-square analyses were performed (see Table 6). Overall, results revealed a significant difference in criminal offence histories, with *repeat high-range speeding offenders* more likely to have committed a previous criminal offence compared to either the *other offenders* or the *once only low-range offenders*. Indeed, more than half of the *repeat high-range speeding offenders* had a criminal history (55.2%), compared to 21% of *other offenders* and 7% of *once only low-range offenders*. In terms of the types of criminal offences committed by the three different speeding offender groups, analyses revealed that the *repeat high-range offenders* were significantly more likely to have committed each of the different types of criminal offences compared to *once only low-range offenders*. Furthermore, the *repeat high-range offenders* also differed significantly from the *other offenders* for all offences except traffic (see Table 6).

Table 6. Characteristics of criminal history according to offender type.

| Variable | Level | *Once only low-range* offenders | | *Other* offenders | | *Repeat high-range* offenders | |
|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % |
| Any criminal history | Yes | 21 | 7.0* | 63 | 21.0* | 221 | 55.2* |
| | No | 279 | 93.0* | 237 | 79.0* | 179 | 44.8* |
| | | $\chi^2$ (1) = 176.44, $p$ < .001, $\varphi_c$ = .50 | | $\chi^2$ (1) = 83.40, $p$ < .001, $\varphi_c$ = .35 | | Referent | |
| Property offences | Yes | 8 | 2.7* | 28 | 9.3* | 123 | 30.8 |
| | No | 292 | 97.3 | 272 | 90.7 | 277 | 69.3 |
| | | $\chi^2$ (1) = 88.88, $p$ < .001, $\varphi_c$ = .36 | | $\chi^2$ (1) = 46.48, $p$ < .001, $\varphi_c$ = .26 | | Referent | |
| Drug | Yes | 3 | 1.0* | 23 | 7.7* | 119 | 29.8 |
| | No | 297 | 99.0 | 277 | 92.3 | 281 | 70.2 |
| | | $\chi^2$ (1) = 98.46, $p$ < .001, $\varphi_c$ = .38 | | $\chi^2$ (1) = 51.70, $p$ < .001, $\varphi_c$ = .27 | | Referent | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Person | Yes | 3 | 1.0* | 10 | 3.3* | 60 | 15.0 |
| | No | 297 | 99.0 | 290 | 96.7 | 340 | 85.0 |
| | | $\chi^2$ (1) = 41.03, $p$ < .001, $\varphi_c$ = .24 | | $\chi^2$ (1) = 25.93, $p$ < .001, $\varphi_c$ = .19 | | Referent | |
| Traffic | Yes | 11 | 3.7 | 18 | 6.0 | 43 | 10.8 |
| | No | 289 | 96.3 | 282 | 94.0 | 357 | 89.2 |
| | | $\chi^2$ (1) = 12.08, $p$ = .002, $\varphi_c$ = .13 | | $\chi^2$ (1) = 4.86, $p$ = .027, $\varphi_c$ = .08 | | Referent | |
| Order | Yes | 3 | 1.0* | 18 | 6.0* | 81 | 20.3 |
| | No | 297 | 99.0 | 282 | 94.0 | 319 | 79.7 |
| | | $\chi^2$ (1) = 60.16, $p$ <.001, $\varphi_c$ = 0.29 | | $\chi^2$ (1) = 26.67, $p$ < .001, $\varphi_c$ = 0.20 | | Referent | |
| Regulation | Yes | 1 | 0.3* | 2 | 0.7* | 43 | 10.8 |
| | No | 299 | 99.7 | 298 | 99.3 | 357 | 89.2 |
| | | $\chi^2$ (1) = 31.58, $p$ <.001, $\varphi_c$ = 0.21 | | $\chi^2$ (1) = 28.98, $p$ < .001, $\varphi_c$ = .20 | | Referent | |

Note: Cramer's V = $\phi_c$ (small = .10, moderate = .30, large = .50).
* These cells had a major contribution to the chi-square result (standardised residuals ± 3.29).
* Significance < 0.01

### *3.4 Logistic regression analysis to examine differences in offender characteristics*

To investigate the characteristics of the three offender groups, two logistic regression analyses were conducted (see Table 7). The first compared *repeat high-range* and *once only low-range speeding offenders*, while the second compared *repeat high-range* and *other offenders*. The logistic regression model for the *once only low-range* versus *repeat high-range offenders* was significant [$\chi^2$ (14) = 4151.88, $p$ < .001], with approximately half of the variance in offender status explained by all variables in the equation [Nagelkerke $R^2$ = .55]. Results revealed that there were significant differences for gender, age, licence level, licence class, previous alcohol offences, and crash involvement. Specifically, relative to *once only low-range speeding offenders*:

- Females had 10 times lower odds of being *repeat high-range offenders* compared to males;

- Offenders aged 30 years or older had lower odds of being *repeat high-range offenders* compared to offenders younger than 30 (from 3.1 to 100 times lower odds);
- Offenders with a provisional licence had 2.1 times greater odds of being *repeat high-range offenders* compared to open licence holders;
- Offenders who held a motorcycle licence had 1.6 times greater odds of being *repeat high-range offenders* compared to those offenders with just a car licence;
- Offenders with a previous alcohol related traffic offences had 3.6 times greater odds of being a *repeat high-range offender* compared to those with no previous alcohol related offence; and
- Offenders with a crash history had 3.8 times greater odds of being a *repeat high-range offender* compared to those with no crash history.

The second logistic regression model (comparing *repeat high-range offenders* and *other offenders*) was also significant [$\chi^2$ (14) = 3677.30, $p$ < .001], with approximately 16% of the variance in offender status explained by all variables in the equation [Nagelkerke $R^2$ = .16]. There were a number of significant differences between the *repeat high-range* and *other offenders* with regard to personal characteristics. Specifically, relative to *other offenders*:

- Females had 3.8 times lower odds of being *repeat high-range offenders* compared to males;
- Offenders aged 30 years or older had lower odds of being *repeat high-range offenders* compared to offenders younger than 30 (from 1.8 to 14.3 times);
- Offenders with provisional licences had 1.7 times greater odds of being *repeat high-range offenders* compared to those with an open licence;
- Offenders with a motorcycle licence had 1.4 times greater odds of being *repeat high-range offenders* compared to those offenders with just a car licence;

- Offenders with at least one previous unlicensed driving offence had 2.3 times greater odds of being a *repeat high-range offender* compared to those with no previous unlicensed driving offences;
- Offenders with at least one seatbelt offence had 1.6 times greater odds of being a *repeat high-range offender* compared to with no previous seatbelt offences;
- Offenders with at least one 'other' traffic offence had 2.1 times greater odds of being a *repeat high-range offender* compared to with no previous 'other' offence; and
- Offenders with a crash history had 1.8 times greater odds of being a *repeat high-range offender* compared to those with no crash history.

Table 7. Adjusted ORs and 99.9% CIs for *repeat high-range offenders* vs. *once only low-range offenders* and *repeat high-range offenders* vs. *other offenders* on personal characteristics and offence history.

| | | *Repeat high-range* vs. *Once only low- range offenders* | | | *Repeat high-range* vs. *Other offenders* | | |
|---|---|---|---|---|---|---|---|
| | | OR[1] | 99.9% CI | p | OR[1] | 99.9% CI | p |
| Gender | Male | 1.00 | Referent | | 1.00 | Referent | |
| | Female | 0.11 | (0.09-0.15) | < .001 | 0.27 | (0.22-0.33) | < .001 |
| Age | 17-24 | 1.00 | Referent | | 1.00 | Referent | |
| | 25-29 | 0.85 | (0.60-1.21) | .19 | 0.90 | (0.75-1.09) | .80 |
| | 30-39 | 0.34 | (0.24-0.46) | < .001 | 0.56 | (0.46-0.67) | < .001 |
| | 40-49 | 0.15 | (0.10-0.22) | < .001 | 0.31 | (0.24-0.39) | < .001 |
| | 50-59 | 0.06 | (0.04-0.09) | < .001 | 0.18 | (0.13-0.25) | < .001 |
| | 60-69 | 0.02 | (0.01-0.03) | < .001 | 0.09 | (0.04-0.19) | < .001 |
| | 70+ | 0.01 | (0.01-0.03) | < .001 | 0.07 | (0.02-0.30) | < .001 |
| Licence level | Open | 1.00 | Referent | | 1.00 | Referent | |
| | Provisional | 2.13 | (1.49-3.01) | < .001 | 1.73 | (1.44-2.05) | < .001 |
| | Learner | 1.20 | (0.75-1.88) | .19 | 1.09 | (0.82-1.42) | .31 |
| Licence class | Car only | 1.00 | Referent | | 1.00 | Referent | |
| | Motorcycle | 1.65 | (1.30-2.10) | < .001 | 1.35 | (1.17-1.54) | < .001 |
| | Heavy vehicle only | 0.87 | (0.59-1.30) | .24 | 0.80 | (0.60-1.07) | .01 |
| | Car and heavy vehicle | 1.10 | (0.50-2.45) | .71 | 1.02 | (0.63-1.63) | .59 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Alcohol related | No | 1.00 | | | 1.00 | Referent | |
| | Yes | 3.58 | (2.12-6.15) | < .001 | 1.16 | (0.94-1.44) | .03 |
| Dangerous driving[2] | No | - | | | 1.00 | Referent | |
| | Yes | - | | | 1.27 | (0.90-1.94) | .04 |
| Unlicensed driving[2] | No | - | | | 1.00 | Referent | |
| | Yes | - | | | 2.27 | (1.75-2.97) | < .001 |
| Seatbelt[2] | No | - | | | 1.00 | Referent | |
| | Yes | - | | | 1.60 | (1.34-1.93) | < .001 |
| Other[2] | No | - | | | 1.00 | Referent | |
| | Yes | - | | | 2.03 | (1.78-2.35) | < .001 |
| Crash | No | 1.00 | | | 1.00 | | |
| | Yes | 3.85 | (2.52-5.88) | < .001 | 1.83 | (1.54-1.93) | < .001 |

[1] Adjusted odds ratio with all variables in the equation.
[2] No *Once only low-range* offenders had previously committed this offence.

## 4. Discussion

The paper reports profiling information about speeding offenders and is part of a larger project that was initiated to assess the deterrent effects of increased speeding penalties in Queensland, Australia. Specifically, this paper reports results about demographic data and data relating to traffic offences, crashes and criminal history to explore the characteristics and predictors of repeat high-range speeding offenders in Queensland. The results highlight that speeding offenders are not an homogenous group. Categorising speeding offenders on the extent and severity of their previous speeding offences revealed a number of significant differences between *repeat high-range* and *once only low-range* and *other offender* groups in terms of personal characteristics, crash histories, and traffic and criminal offence histories. Specifically, *repeat high-range speeding offenders* were more likely to be male, younger, hold a provisional licence and to hold a motorcycle licence compared to *once only low-range offenders* and *other offenders*. *Repeat high-range offenders* were also more likely to have committed a

range of previous traffic offences, including drink driving, unlicensed driving, dangerous driving, seatbelt, and 'other' offences, compared to the other two offender groups. Indeed, it is worth noting that none of the *once only low-range speeding offenders* in our sample had a record of previous unlicensed driving, dangerous driving, seatbelt, or 'other' offences and very few previous drink driving offences in the five year period examined for these offences.

In regard to crash histories, results revealed that *repeat high-range offenders* had a significantly greater likelihood of crash involvement compared to both the *once only low-range* and *other offenders*, however were not significantly more likely to have been involved in multiple previous crashes. When analysing the characteristics of these crashes, a number of additional interesting findings were revealed. Specifically, *repeat high-range speeding offenders* were significantly more likely to be involved in single-vehicle crashes and speed-related crashes and significantly less likely to be involved in crashes while driving a heavy vehicle. Interestingly however, there were no significant differences between offender types regarding who was deemed to be most-at-fault in the crash.

Analysis of a subsample of 1,000 speeding offenders from each of the three offender groups revealed that almost one-third had committed at least one previous criminal offence (across lifetime offending records) with property and drug offences the most common. Within this subsample, *repeat high-range speeding offenders* were found to be significantly more likely to have committed a previous criminal offence compared to either of the other two offender groups. Notably, more than half of the *repeat high-range speeding offenders* had a criminal history (55.2%), compared to one-fifth of the *other offenders* group and less than ten percent of the *once only low-range offender* group. *Repeat high-range speeding offenders* were significantly more likely to have committed all offences types compared to the *once only low-range speeding offenders.* Also, the *repeat high-range speeding offenders* were significantly more likely to have committed criminal offences (with the exception of traffic offences)

compared to *other offenders*. These findings concur with self-reported research from the USA where driving citations were positively associated with criminal behaviour (Sansone et al., 2011). Together, these results highlight that for some drivers/riders, there is a link between traffic offending and other offending behaviours.

Finally, logistic regression analyses confirmed our previous findings and further highlighted the personal, crash, and offence characteristics that significantly predict the likelihood of being a *repeat high-range speeding offender*. Specifically, analyses revealed that, when compared to either the *once only low-range* or *other offenders* groups, *repeat high range speeding offenders* were more likely to be male; less than 30 years of age; provisional and/or motorcycle licence holders; and to have been involved in a crash. Moreover, the *repeat high-range offenders* were more likely to have a previous alcohol related traffic offence compared to *once only low-range offenders* and more likely to have a previous unlicensed driving, seatbelt or 'other' offence compared to *other offenders*.

Perhaps not surprisingly, statistically the differences between *once only low-range* and *repeat high-range offenders* were consistently of a greater magnitude compared to those between *other offenders* and *repeat high-range offenders*. Similar results were observed in relation to the amount of variance explained by the logistic regression models. However, the adoption of a stringent alpha rate suggests that the results may reflect the rather intuitive notion that *repeat high-range offenders* are significantly different to the other two groups, but that greater differences exist between low- and high-range speeding offenders.

These findings are largely consistent with previous research that has identified males and younger drivers as being more likely to be high-range and repeat speeding offenders, as well as the link between speeding offences and other illegal driving offences (Lawpoolsri, et al., 2007; Manderson, et

al., 2004). They are also consistent with annual community attitudes surveys conducted in Australia indicating that those who held full motorcycle licences were reported as significantly less likely than other licence class holders (except heavy vehicle) to have conservative attitudes towards speeding and speed enforcement (Petroulias, 2011). Other research suggests that high-range offenders, in particular, have a number of psychological differences compared to other road users and that such differences have important implications for the development and subsequent effectiveness of countermeasures (Harrison, 2008; Styles et al., 2009). Indeed, it has been suggested that high-range and repeat offenders are less amenable to behaviour change, compared to lower range offenders (Fylan et al., 2006; Harrison, 2008). Furthermore, research that investigated youth offenders in the United States revealed differences in the way offenders viewed sanctions. For instance, those deemed as serious offenders were found to be more likely to hold lower perceptions of the risks associated with detection and punishment as well as to perceive greater rewards and fewer costs associated with offending when compared to less serious offenders (Loughran et al, 2012). Taken together with the findings of this study, it is argued that innovative approaches to speeding enforcement, sanctions and offender management are required in order to overcome the resistance to change among this group of high-risk drivers. The use of new technologies, such as Intelligent Speed Adaptation, may prove useful in this regard and has shown promising results in changing behaviour of speeding recidivists in a trial conducted in the Australian state of Victoria (see Young et al., 2013). Additionally, those who aim to develop interventions that target repeat offenders in general should keep in mind that these individuals often engage in risk-taking across a range of domains. Therefore, there may be value in developing more multi-faceted interventions highlighting the risks and likely legal consequences of engaging in different types of illegal behaviours. For instance, a program targeting repeat drug offenders should possibly have a component addressing the risks of drug driving and other illegal driving behaviours.

To date there is limited evidence to indicate that increasing the severity of sanctions and penalties, in isolation, can deter offending (Briscoe, 2004; Nichols & Ross, 1990). Other results stemming from the program of research of which the current study is part (Watson et al., 2010) corroborate the complexity of this issue and demonstrate that the mechanisms used to assess recidivism and specific deterrent effects of penalties can produce differential outcomes when evaluating countermeasures. Moreover, there are a range of factors that would seem critical to the potential effectiveness of penalty increases, such as ensuring drivers are aware that penalties have increased, perceive the new penalties as sufficiently severe enough to motivate avoidance of the proscribed behaviour and perceive that detection and apprehension in association with the behaviour is relatively certain. In the context of the current study, the findings suggest that graduated penalty schemes, whereby more severe sanctions are administered for high-range and repeat speeding offences (e.g., similar to drink driving sanctions in Australia and some other countries), may be necessary to deter problematic traffic offenders. In addition, other lessons may also be learnt from drink driving sanctions (e.g., the use of alcohol ignition interlocks and vehicles impoundment for repeat offenders). The use of more innovative countermeasures such as behavioural modification programs, vehicle impoundment, and/or the compulsory installation of Intelligent Speed Adaptation devices in the vehicles of high-range and repeat speeding offenders should be considered and evaluated to determine their effectiveness in altering the behaviour of this high-risk group (Styles et al., 2009).

The limitations of this study should be borne in mind when interpreting the findings. Firstly, the data used for this research are typically collected primarily for administrative, rather than research purposes and, as such, are often limited with regard to the level of sensitivity and specificity necessary for conducting scientifically rigorous research. In addition, errors occurring during recording and coding can result in inaccurate or incomplete data. Secondly, the offender categories used for analyses in this paper were arbitrarily determined by the researchers and it is acknowledged that there are other ways

in which the dataset could have been divided to delineate offender and index offence characteristics. However, given the growing body of literature supporting our findings that repeat and/or high-range speeding offenders are a problematic group, our classification of offenders and offences appears warranted. Thirdly, it was not possible to investigate whether offenders paid the monetary fines associated with the offences described in this paper. Therefore, results are based on the assumption that the penalty system in Queensland was operating efficiently and as designed, even though it is acknowledged that this may not necessarily be the case for every individual. Finally, it is acknowledged that the data used for analyses reflect detections only and do not necessarily represent all episodes of speeding that occurred across the road network in Queensland during the study period.

## 6. Conclusion

The results of this study indicate that speeding offenders are not a homogenous group and that important differences exist between different types of offenders, based on the extent and severity of their offending behaviour. The findings confirmed the relationship between a number of personal characteristics, namely gender and age, and the increased likelihood of more extensive and problematic offending. Moreover, the research revealed that repeat high-range speeding offenders are a problematic group of drivers who are more likely to have been involved in traffic crashes, committed other driving offences and also to have committed criminal offences. Authorities face many challenges in attempting to influence the behaviour of such groups of drivers, as there are, it seems, multiple offending behaviours to contend with. There is still much to learn regarding the deterrent effect of a range of sanctions and the effects of penalty changes on road user behaviours. The development and evaluation of more innovative approaches targeted towards more problematic offenders requires greater research attention.

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## References

Aarts, L., & van Schagen, I. (2006). Driving speed and the risk of road crashes: A review. Accident Analysis & Prevention, 38(2), 215-224. doi: 10.1016/j.aap.2005.07.004

Afukaar, F. K. (2003). Speed control in LMICs: issues, challenges and opportunities in reducing road traffic injuries. Injury Control and Safety Promotion, 10, 77-81.

Aron, A., & Aron, E. N. (2003). Statistics for Psychology (3rd ed.). Upper Saddle River, New Jersey: Prentice Hall.

Australian Transport Council. (2011). National Road Safety Strategy 2011-2020. Canberra: Australian Transport Council.

Briscoe, S. (2004). Raising the bar: Can increased statutory penalties deter drink-drivers? Accident Analysis and Prevention, 36(5), 919-929. doi: 10.1016/j.aap.2003.10.005

Brown, S. L. (2002). The relative effectiveness of self-reported deterrents to speeding. Road and Transport Research, 11(1), 43-51.

Corbett, C. (2001). Explanations for "understating" in self-reported speeding behaviour. Transportation Research Part F, 4(2), 133-150. doi: 10.1016/S1369-8478(01)00019-5

561 Delaney, A., Diamantopoulou, K., & Cameron, M. H. (2003). MUARC'S Speed Enforcement Research:
562 Principles Learnt and Implications for Practice. Melbourne: Monash University Accident
563 Research Centre.
564 Fernandes, R., Job, R. F. S., & Hatfield, J. (2007). A challenge to the assumed generalizability of
565 prediction and countermeasure for risky driving: Different factors predict different risky driving
566 behaviors. Journal of Safety Research, 38(1), 59-70. doi: 10.1016/j.jsr.2006.09.003
567 Fildes, B. N., Langford, J., Andrea, D., & Scully, J. (2005). Balance Between Harm Reduction and
568 Mobility in Setting Speed Limits: A Feasibility Study: AP-R272/05: Austrroads.
569 Fildes, B. N., & Lee, S. (1993). The Speed Review:Road Environment, Behaviour, Speed Limits,
570 Enforcement and Crashes. Melbournne: Monash University Accident Research Centre.
571 Fleiter, J. J., Lennon, A., & Watson, B. (2010). How do other people influence your driving speed?
572 Exploring the 'who' and the 'how' of social influences on speeding from a qualitative perspective.
573 Transportation Research Part F: Traffic Psychology and Behaviour, 13, 49-62.
574 Fleiter, J. J., & Watson, B. (2006). The speed paradox: the misalignment between driver attitudes and
575 speeding behaviour. Journal of the Australasian College of Road Safety, 17(2), 23-30.
576 Freeman, J., Liossis, P., Schonfeld, C., Sheehan, M., Siskind, V., Watson, B. (2006). The self-reported
577 impact of legal and non-legal sanctions on a group of recidivist drink drivers. Transportation
578 Research Part F, 9, 53-64.
579 Fuller, R., Bates, H., Gormley, M., Hannigan, B. S., S., Broughton, P., Kinnear, N., et al. (2008). The
580 Conditions for Inappropriate High Speed: A Review of the Research Literature from 1995 to
581 2006. London, United Kingdom: Department for Transport.
582 Fylan, F., Hempel, S., Grunfeld, B., Connor, M., & Lawton, R. (2006). Effective interventions for
583 speeding motorists, Road Safety Research Report No. 66. London: Department of Transport.
584 Harrison, W. (1998). Applying psychology to a reluctant road safety: A comment on South (1998).
585 Australian Psychologist, 33(3), 238-240. doi: 10.1080/00050069808257413

586 Harrison, W. (2008). Psst – you know they're not the same as us: A psychologist's view of motivation
587 and behaviour change in relation to high risk road users. Paper presented at the Joint
588 Australasian College of Road Safety and Queensland Parliamentary Travelsafe Committee
589 conference "High Risk Road Users - Motivating behaviour change: what works and what doesn't
590 work?", May 2008, Brisbane, Queensland.
591 Harrison, W., Fitzgerald, E. S., Pronk, N. J., & Fildes, B. N. (1998). An Investigation of Characteristics
592 Associated with Driving Speed. Melbourne: Monash University Accident Research Centre.
593 Homel, R. (1988). Policing and Punishing the Drinking Driver: A Study of General and Specific
594 Deterrence. New York: Springer-Verlag.
595 Iversen, H., & Rundmo, T. (2002). Personality, risky driving and accident involvement among
596 Norwegian drivers. Personality and Individual Differences, 33(8), 1251-1263. doi:
597 10.1016/S0191-8869(02)00010-7
598 Jonah, B. A. (1997). Sensation seeking and risky driving: A review and synthesis of the literature.
599 Accident Analysis and Prevention, 29(5), 651-665. doi: 10.1016/S0001-4575(97)00017-1
600 Keall, M. D., Povey, L. J., & Frith, W. J. (2001). The relative effectiveness of a hidden versus a visible
601 speed camera programme. Accident Analysis & Prevention, 33(2), 277-284. doi: 10.1016/S0001-
602 4575(00)00042-7
603 Kloeden, C. N., McLean, A. J., Moore, V. M., & Ponte, G. (1997). Travelling Speed and the Risk of
604 Crash Involvement: Volume 1 - Findings. Adelaide: NHMRC Road Accident Research Unit, The
605 University of Adelaide.
606 Lawpoolsri, S., Li, J., & Braver, E. R. (2007). Do speeding tickets reduce the likelihood of receiving
607 subsequent speeding tickets? A longitudinal study of speeding violators in Maryland. Traffic
608 Injury Prevention, 8(1), 26-34. doi: 10.1080/15389580601009764
609 Li, J., Amr, S., Braver, E. R., Langenberg, P., Zhan, M., Smith, G. S., et al. (2011). Are current law
610 enforcement strategies associated with a lower risk of repeat speeding citations and crash

611 Involvement? A longitudinal study of speeding Maryland drivers. Annals of Epidemiology, 21(9),
612 641-647. doi: 10.1016/j.annepidem.2011.03.014
613 Liu, C., Chen, C. L., Subramanian, R., & Utter, D. (2005). Analysis of Speeding-Related Fatal Motor
614 Vehicle Traffic Crashes. Washington D.C.: National Highway Traffic Safety Administration.
615 Loughran, T. A., Piquero, A. R., Fagan, J., & Mulvey, E. P. (2012). Differential deterrence: Studying
616 heterogeneity and changes in perceptual deterrence among serious youthful offenders. Crime &
617 Delinquency, 58(1), 3-27. doi: 10.1177/0011128709345971
618 Manderson, J., Siskind, V., Bain, C., & Watson, B. (2004). Speeding recidivism and road safety. Paper
619 presented at the Australasian Road Safety Research Policing Education Conference, Perth.
620 Nichols, J. L., & Ross, H. L. (1990). The effectiveness of legal sanctions in dealing with drinking drivers.
621 Alcohol, Drugs and Driving, 6(2), 33-60.
622 Odero, W., Garner, P., & Zwi, A. (1997). Road traffic injuries in developing countries: a comprehensive
623 review of epidemiological studies. Tropical Medicine and International Health, 2(5), 445-460. doi:
624 10.1046/j.1365-3156.1997.d01-296.x
625 Parker, D., Reason, J., Manstead, A., & Stradling, S. (1995). Driving errors, driving violations and
626 accident involvement. Ergonomics, 38(5), 1036-1048. doi: 10.1080/00140139508925170
627 Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A. A., Jarawan, E., et al. (Eds.). (2004). World
628 Report on Road Traffic Injury Prevention. Geneva: World Health Organization.
629 Petroulias, T. (2011). Community Attitudes to Road Safety – 2011 Survey Report. Canberra:
630 Department of Infrastructure and Transport.
631 Robinson, D., & Singh, R. (2006). Contributory factors to road accidents Road Casulaties: Great Britain
632 2006. London: Department for Transport.
633 Rose, G. (2000). The Criminal Histories of Serious Traffic Offenders. London: The Research,
634 Development, and Statistics Directorate of the Home Office.
635 Ross, H. L. (1982). Deterring the Drinking Driver. Lexington, MA: Lexington Books.

636 Rothengatter, T. (1988). Risk and the absence of pleasure: A motivational approach to modelling road
637 user behaviour. Ergonomics, 31(4), 599-607. doi: 10.1080/00140138808966702
638 Sansone, R. A., Lam, C., & Wiederman, M. W. (2011). Driving Citations: Relationships With Criminal
639 Behavior. Traffic Injury Prevention, 12(3), 217-219. doi:10.1080/15389588.2011.553642.
640 Stead, M., Tagg, S., MacKintosh, A. M., & Eadie, D. (2005). Development and evaluation of a mass
641 media Theory of Planned Behaviour intervention to reduce speeding. Health Education
642 Research, 20(1), 36-50. doi: 10.1093/her/cyg093
643 Stradling, S., Campbell, M., Allan, I. A., Gorell, R. S. J., Hill, J. P., Winter, M. G., et al. (2003). The
644 Speeding Driver: Who, How and Why? Edinburgh: Scottish Executive Social Research.
645 Stradling, S., Meadows, M., & Beatty, S. (2004). Characteristics and crash involvement of speeding,
646 violating and thrill-seeking drivers. In T. Rothengatter & R. D. Huguenin (Eds.), Traffic and
647 Transport Psychology: Theory and Application (pp. 177-192). Amsterdam: Elsevier.
648 Styles, T., Imberger, K., & Cairney, P. (2009). Development of a Best Practice Intervention Model for
649 Recidivist Speeding Offenders: Austroads Project No. SS1389. Sydney, Australia: Austroads
650 Publication No. AP-T134/09.
651 Tay, R., Champness, P., & Watson, B. (2003). Personality and speeding: Some policy implications.
652 IATSS Research, 27(1), 68-74.
653 Transport and Main Roads. (2014). Queensland Road Crash Weekly Report # 862, Brisbane: Transport
654 and Main Roads (TMR).
655 Treat, J. R., Tumbas, N. S., Mcdonald, S. T., Shinar, D., & Hume, R. D. (1979). Tri-Level Study of the
656 Causes of Traffic Accidents, Executive Summary, Report No. DOTHS- 805-099. Washington,
657 DC: National Highway Traffic Safety Administration.
658 von Hirsch, A., Bottoms, A. E., Burney, E., & Wikstrom, P. O. (2000). Criminal Dterrence and Sentence
659 Severity. Oxford: Hart Publishing.

660 Watson, B., Siskind, V., Fleiter, J. J., & Watson, A. (2010). Different approaches to measuring specific
661 deterrence: Some examples from speeding offender management. Paper presented at the
662 Australasian Road Safety Research, Policing and Education Conference, Canberra, Australian
663 Capital Territory.
664 Watson, B., Siskind, V., Fleiter, J., Watson, A. & Soole, D. (2014). Assessing specific deterrence effects
665 of increased penalties: Examples from speeding offender management using four measures of
666 recidivism; manuscript in preparation.
667 West, R., & Hall, J. (1997). The role of personality and attitudes in traffic accident risk. Applied
668 Psychology: An International Review, 46(3), 253-264. doi: 10.1080/026999497378359
669 Williams, A. F., Kyrychenko, S. Y., & Retting, R. A. (2006). Characteristics of speeders. Journal of
670 Safety Research, 37(3), 227-232. doi: 10.1016/j.jsr.2006.04.001
671 Young, K., Stephan, K., Newstead, S., Rudin-Brown, C., Tomasevic, N., & Lenné, M. (2013). Repeat
672 Speeders Trial - Final Evaluation Report: Monash University Accident Research Centre,
673 Melbourne.